



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

SUMMER-2024	
Exam Seat No.:	
Academic Year:2023-2024	Semester:IV
Class:SY	Program:B.Tech
Branch Code:ADS/COM/CSD	Pattern:2022
Name of Course:Operating Systems	Course Code:COM222013
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 3 pages.
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

Question No. 1 Attempt following Question

- 1 Explain Batch Operating System with diagram. (6) CO1

Question No. 2 Attempt following Question

- 2 Demonstrate the use of Round Robin (RR) scheduling algorithm. (6) CO2

Consider the following set of processes, with the length of the CPU burst given in milliseconds:

Process Burst Time

P1	2
P2	1
P3	8
P4	4
P5	5

The processes are assumed to have arrived in the order P1, P2, P3, P4, P5, all at time 0.

- i. Illustrate the execution of these processes using the RR scheduling algorithm with time quantum = 2. Draw the Gantt chart.
- ii. What is the turnaround time of each process?
- iii. What is the waiting time of each process?

Question No. 3 Attempt following Question

- 3.a) Demonstrate the use of Bankers algorithm with the given system. (6) CO3

Consider a system with five processes P_0 through P_4 and three resource types A , B , and C . Resource type A has ten instances, resource type B has five instances, and resource type C has seven instances. Suppose that, at time T_0 , the following snapshot of the system has been taken:

	<i>Allocation</i>	<i>Max</i>	<i>Available</i>
	<i>A B C</i>	<i>A B C</i>	<i>A B C</i>
P_0	0 1 0	7 5 3	3 3 2
P_1	2 0 0	3 2 2	
P_2	3 0 2	9 0 2	
P_3	2 1 1	2 2 2	
P_4	0 0 2	4 3 3	

Answer the following questions using the banker's algorithm:

- What is the content of the matrix *Need*?
- Is the system in a safe state? If so what is the sequence of process satisfying the safety criteria.
- If a request from process P_1 arrives for (1,0,2), can the request be granted immediately?

OR

3.b) Explain Dining philosopher problem of synchronization. (6) CO3

3.c) Explain Mutex locks? Explain the solution to the critical section problem. (5) CO3

OR

3.d) Illustrate Hardware solution for critical section problem using Test and Set instructions. (5) CO3

3.e) Explain deadlock recovery mechanisms. (5) CO3

OR

3.f) Explain necessary condition in which deadlock situation can arise. (5) CO3

Question No. 4 Attempt following Question

4.a) Demonstrate the use of following page replacement algorithm. Consider the given page reference string: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. (6) CO4

How many page faults would occur for the following replacement algorithms, assuming seven memory frames are available. Remember that all frames are initially empty, so your first unique pages will cost one fault each.

- FIFO replacement
- LRU replacement

OR

4.b) Explain any two dynamic storage allocation schemes with examples. (6) CO4

4.c) Illustrate the use of following contiguous memory allocation schemes. Given five memory partitions of 100 KB, 500 KB, 200 KB, 300 KB, and 600 KB (ill order), how would the best-fit, and worst-fit algorithms place processes of 212 KB, 417 KB, 112 KB, and 426 KB (in order)? Which algorithm makes the most efficient use of memory? (5) CO4

OR

4.d) Explain the following terms of memory management : (5) CO4

i. Fixed Partitioning ii. Variable partitioning iii. Fragmentation

4.e) Explain hashed page table scheme with neat diagram. (5) CO4

OR

4.f) Demonstrate the use of “Optimal page replacement” algorithm with suitable example. (5) CO4

Question No. 5 Attempt following Question

5.a) Demonstrate the use of disk scheduling algorithm with following example... (6) CO5

Suppose that disk drive has 400 cylinders, numbered 0-399. The drive is currently serving the request at cylinder 160. The queue of pending requests in FIFO order is 370, 30, 390, 130, 310, 170, 340, 180. Starting from the current head position what is the total distance that disk arm moves to satisfy all the pending requests for the following disk scheduling algorithm.

i. SSTF

ii. SCAN

OR

5.b) Explain following Linux Shell Commands with proper syntax and suitable example (6) CO5

i. tr

ii. egrep

iii. awk

5.c) Explain C-SCAN scheduling algorithm with example. (5) CO5

OR

5.d) Explain the need of disk scheduling algorithm. Compare between Seek Time and Transfer Time (5) CO5

5.e) Explain the parameters on which the I/O devices are differentiate. (5) CO5

OR

5.f) Explain essential features of Linux Operating System with diagram. (5) CO5

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